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WHY PEACEFUL KILAUEA IS ON THE RAMPAGE

By Dr. T. A. Jaggar, Jr.

Director of the Kilauea Volcano Observatory, Hawaii.

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The Hawaiian volcanoes are popularly supposed to be the most placid in the world but they sometimes belie their reputation. Kilauea volcano on the 18th of May of this year produced an explosive eruption quite comparable to those of Vesuvius.

This was not wholly unforseen, for we know that natives were killed by a blast from Kilauea 134 years ago. It is known also from Japanese statistics that 130 years is a critical interval between eruptions at many volcanoes, and a suspicion that this might apply to Kilauea led us in 1918 to publish a warning that about 1920 might be a dangerous time.

The warning was abundantly justified. The year 1920 produced tremendous lava flows, for the next four years the lava sank lower and lower within the mountain, and in 1924 the famous fire pit of Kilauea collapsed violently so as to plug the accumulated gases beneath, and a terrible explosion ensued.

We do not yet know the cause of such explosions but there is much evidence from observations made during the last ten years to justify the working hypothesis that the lava sank so low as to let the rain water underground close over the cracks containing the glowing slag. There is everywhere a great sea of underground water in all lands. In Hawaii the rocks are so porous that this water stands inside the island at a very low level, so low that it can not be reached by ordinary wells, but flows out as sea-level springs. Ordinarily the lava column at Kilauea crater must cover itself with a shell of hardened slag in the shaft beneath the volcanic vent, and keep the water out by evaporating it with its heat.

This year, however, there was a swarm of earthquakes in Puna, at the east end of Hawaii. The ground cracked open in huge crevasses, as though a lava flow were going to break out at sea level. The ground, however, subsided. Then the fire pit 3700 feet higher near the summit of the mountain began to cave in, great black clouds of avalanche dust shot upwards, the pit grew bigger and bigger, steam appeared, and then the black clouds growled and roared and hurled out huge broken rocks without a particle of fresh lava. It was just as though the pit had been converted into an upright quarry with big blasts let off at intervals of about six hours. Boulders weighing ten tons were hurled hundreds of feet from the

explosion center. Dust curdled into rain clouds and came down as mud balls. Gutters on the hotel roofs broke down with the weight of rock powder. A man trying to photograph the pit at close range was killed by a barrage of boulders. The eruption lasted two weeks and the great cauldron left was 3500 feet long and 1300 feet deep.

All the other activities of Kilauea have shown fresh black glassy lavas and so do the other Hawaiian volcanoes in most of their eruptions. Until last February the fire pit was full of boiling lava fountains. The succession of events since 1914 has been Outpouring of lava at 13,000 feet above the sea, then 8,000 feet, then 3,000 feet and finally this inpouring at sea level itself. It seems logical to conclude that such explosive eruption is a secondary matter occasioned by the plugging of the vent, the closing in of the underground waters, and the consequent development of enormous steam pressure. The interesting feature of this is that the water explanation accounts, not for ordinary lava activity, but only for the exceptional crises of explosion. Explosive eruption at a lava volcano is a secondary phenomenon, and primary volcanism may be fundamentally dependent on hydrogen and other deep gases.

AMERICA'S FIRST AIR LINER SOON TO CROSS UNITED STATES

The ZR-3, America's first giant, passenger-carrying airship, now being prepared for its trans-oceanic flight from Friedrichshafen, Germany, to Lakehurst, New Jersey, may be sent across the continent soon after its delivery to the United States, according to tentative plans under consideration by the Navy Department. Mooring masts for the accomodation of the big aerial liner have been erected at Forth Worth, Texas, San Diego, California, and Camp Lewis, Washington.

Before starting this more protracted cruise, short trips will probably be made from Lakehurst to determine the exact differences in behavior in the air of the new commercial ship as compared with the Shenandoah.

The new ship is not a sister ship of the American-built Shenandoah, designed in 1916 as a military auxiliary. The ZR-3 is strictly a peace-time air liner with Pullman accomodations for twenty passengers and especially designed in 1921-22 to meet the requirements of greater safety and comfort demanded of a commercial craft. It will be used to test the commercial possibilities of lighter-than-air traffic.

Hydrogen gas will be used by the Germans in their flight across the Atlantic, but the ZR-3 will be converted for the use of helium after it is received by the Navy.

The new ship was built by the experts of the famous Zeppelin Company who have made 125 dirigibles. This is the firt ship, however, which was specially designed for its great size. Previous big ships were merely expanded to their mammoth proportions from the designs for smaller ships.

The ZR-3 is larger and speedier than the Shenandoah although not so long. It measures 658 feet in length, whereas the Shenandoah measures 680 feet. Its diameter, however, is 91 feet as compared to 78 feet for the Shenandoah; making it somewhat stockier and giving it a greater gas capacity, 2,400,000 cubic feet as compared to 2,115,000 cubic feet.

The passenger ship is equipped with five twelve-cylinder 400 horsepower Meybach direct reversing motors which will drive it at a top speed of 75 miles an hour, whereas the five six-cylinder 350 horsepower Packari engines of the Shenandoah give it a top speed of 60 miles an hour. At 75 miles an hour, the ZR-3 can go 4,000 miles without refueling and at 60 miles an hour can go 6,000 miles. She carries a crew of 44 beside her twenty passengers. The Shenandoah has a crew of 31.

INSULIN HELPS THIN BABIES RECOVER WEIGHT

Insulin injected into the blood stream of an undernourished infant will help it to utilize the sugar in the food given it, Dr. W. K. Marriot of St. Louis has reported to the American Medical Association.

A malnourished child needs more food in proportion to its weight than normal children but sometimes the malnourished child lacks the ability to take care of all the food it should get, so heroic methods to help it are resorted to. Glucose, the sugar of corn syrup, is injected into the veins along with considerable insulin. That the child makes good use of the food thus strangely taken in is indicated by the increase in weight. The weight gained is not later lost when the treatment is discontinued.

Dr. Marriot used insulin in these cases as a result of the observation that diabetic patients on insulin treatment often gain weight at a phenomenal rate even when their food intake is not excessive.

Dr. Marriot uses his insulin treatment only in the very worst cases of malnutrition. In some of his examples he felt that had it not been for the injection the infant would have died.

"FAT" SPARK NO BENEFIT, SAYS BUREAU OF STANDARDS

The U. S. Bureau of Standards has just given another cherished belief of motorists an impartial shove toward the limbo of discarded notions. A "fat" spark gives no better ignition, no more power, no more "jazz" to motor performance than a "lean" one.

Their suspecions of the correctness of the accepted doctrine were aroused by experiments in Germany, where engines tested with various kinds of sparks failed to show any differences in power developed, so long as the spark was able to cause any ignition at all.

But an engine is a complicated mechanism, and there are many factors besides the quality of the spark that might affect the final resutl. The Bureau engineers therefore decided to use apparatus as simple as possible, which would at the same time permit them to see the explosion as it occurred and to take high-speed photographs of it.

They caged their gas mixtures in soap bubbles, and later in glass globes under pressure, and fired them by means of various types of electrodes, with "juice"

generated in various ways. A special motion picture film was used to record the results.

They found that when the spark was fired, the gas nearest it ignited, and the flames spread in the form of a hollow globe, growing larger and larger until it had used up all of themixture. They found also that the shape of the electrode did not make any difference, and that the spark from the feeblest flivver coil was exactly on a par with a spark from the most expensive magneto, so far as the rapidity of spread of the explosion was concerned.

DEATH RATE LOWEST ON RECORD DURING FIRST HALF OF YEAR

The first half of 1924 has probably registered a lower death rate than was ever experienced for the first six months of any year in the history of the United States and Canada. This is indicated by the mortality records of the industrial policyholders of the Metropolitan Life Insurance Company, as announced by its statistical department which has just completed an analysis of the data.

After an uninterrupted rise for four years, a decline in the diabetes death rate began coincident with the increasing use of insulin in 1923. For the first six months of 1924, the fall amounted to 27.5 per cent. among the white policyholders and to more than 10 per cent. among the colored. Although there is, as yet, no positive proof that the reduction is the direct result of the increasing use of insulin, there is good reason to hope that the two phenomena are connected.

The cancer death rate was a little lower than that in evidence at this time last year. The death rate from alcoholism declined slightly. Deaths from acute poisoning by wood and denatured alcohol appear to be decreasing in the industrial population. Fatal accidents showed a little more satisfactory record. The death rates from automobile fatalities continued to increase - only slightly among the whites but about 10 per cent. among the colored. There have been fewer suicides.

The tyhoid fever rate is still falling and there is promise that a new minimum will be registered in 1924. Diphtheria mortality in the industrail population has been runninglower than ever before. Scarlet fever and whooping cough, it is true, show practically the same death rates as for the corresponding period of last year. However, this really indicates improvement, in view of the much greater number of infant lives exposed to risk and covered by the data this year. There has been no general prevalence of epidemic influenza thus far. The mortality from lobar pneumonia decreased markedly among the white policyholders and slightly among the colored. Bronchial pneumonia caused more deaths than during the same period of last year; but this, again, was due to the relatively high number of infants concerned. An increase in the rate for diarrheal disease is explained on the same ground. The mortality from diseases incidental to pregnancy and childbirth declined among white women, but this improvement did not obtain for colored women.

In the Northwest Territory of Canada six game refuges with a total area of 261,800 square miles have been set aside for the exclusive use of Indians and Eskimos.

MURDERS AND MOTORS BOOST JULY DEATHS

Homicides and auto accidents were plentiful last month, according to figures just made public by Dr. Louis I Dublin of the Metropolitan Life Insurance Company of New York. Based upon returns from 15,000,000 industrial policyholders in America and Canada, the July death rate from homicide, 9.1 per 100,000 insured, is the highest for any single month on record, with the single exception of October, 1923.

Automobile fatalities showed a considerable increase as compared with June, and a rise of more than 19 per cent. over July of last year. All fatal accidents, considered as a group, increased more than one-third over the June figure and also registered a considerable rise over that for July, 1923.

Among the industrial policyholders as a whole, however, the death rate from all causes, 8.4 per 100,000, was identical with that for the same month of 1923, and somewhat lower than the rate for June, 1924.

REPLICA OF APE-MAN'S BONES COMING TO AMERICA

At last America will have a chance to see the shape and size of the oldest human bones yet unearthed, those of Pitecanthropus erectus, ape-man of Java.

More than thirty years ago, Dr. Eugene Dubois, Dutch army surgeon, discovered the fossil remains of this famous and ancient ape-man at Trinil, on the island of Java. Except for a brief exhibition of them shortly after the discovery, the remains had been kept in seclusion by Dr. Dubois at Haarlem Holland, until last summer when representatives of the U. S. National Museum and American Museum of Natural History were allowed to view them.

Dr. Ales Hedlicka, of the National Museum urged upon Dr. Dubois the advisability of having accurate casts of the skeletons on this side of the Atlantic and now he has just recieved word that casts, made by Dr. Dubois himself, of Pithecanthropus' calvarium, endocranical cavity, femur, three teeth and mandibular fragment are being shipped . Another set has been made for the American Museum of Natural History at New York.

Dr. Hrdlicka states that on the basis of his examination of the original remains, the creature they belonged to was undoubtedly human, but of a very low type. It is regarded as unlikely that Pithecanthropus was a direct ancestor of modern man, but it is thought more likely that he represented a collateral race - a sort of great-great-great-uncle - long since extinct.

The new cast of the skull is stated by Dr. Hedlicka as being much more accurate than the one which was made some years ago, and which was the only existing replica of any of the remains. The casts of the brain cavity, of the thigh bone and jawbone and of the three teeth, which comprise all of the remains thus far found, are the first casts of these parts to be made.

Although herring abound in North Pacific waters, smoked herring are imported to this region from Scandinavian countries.

1,000 HORSE POWER ENGINES SEEN NEAR

Thousand horse power aircraft engines are a practical possibility, according to Glenn D. Angle of the U. S. Air Service, Engineering Division. He believes, also, that they can be constructed to weigh less than 1,5 pounds a horse power, — very important consideration, since the problem of aircraft engine designers from the first has been to increase power without greatly increasing weight.

Up to the present only 13 aircraft engines of more than 600 horsepower actually have been desinged and built. Seven were Franch, three British, two American, and one Italiman.

"The U. S, Air Service at the end of the war was without any reliable engine of more than 400 horsepower," Mr. Angle says in a technical statement prepared for the American Machinist. "The following year designs were laid down for an 18-cylinder, W-type engine of 2,778 cu. in. piston displacement. This engine is composed of three rows of six cylinders each, set at an included angle of 40 degrees, an arrangement which probably gives as compact an engine for the displacement as can be produced, having excellent inertia balance and uniformity of torque delivered to the propeller.

"The rated horsepower was 700 at 1,700 revolutions per minute and 750 at 1,800 r.p.m., but the dynamometer tests showed a much greater horsepower. The original engine completed five 50 hour endurance tests. Never before has the first engine built from any design been known to make such a record.

"The weight is 1,770 pounds and at 800 horsepower represents 2.21 pounds a horsepower. Modifications indicate that the weight of the engine can be safely reduced to 1,500 pounds. The weight per horsepower would then be 1.87, the lowest ever obtained for an engine of more than 500 horsepower and lower, in fact, than for the majority of smaller engines.

"The reports of pilots are favorable as regards engine operation. The selection of this 18 cylinder type engine for outputs between 700 and 1500 horsepower has proved sound. The U. S. Army Air Service has the experience that indicates that successful engines of 1,000 to 1,200 horsepower can be built to weight less than 1.5 pounds a horsepower.

ISOLATION OF VITAMIN A CLAIMED BY JAPANESE

What they believe to be Vitamin A has been successfully isolated by two Japanese chemists, K. Takahashi and K. Kawakami. If this actually has been done it is likely to prove an important event in the progress of food chemistry.

Vitamin A, the fat soluble vitamin, is perhaps the most important of these mysterious substances now definitely known to exist. Its absence in food gives rise to rickets in children. It is closely connected with the growth of children and young animals.

It is abundant in butter, egg yolk, cod liver oil, milk, cream and most oily animal fats. Certain fresh vegetables, such as cabbage, spinach, tomatoes, and lettuce, have some of this vitamin. Long exposure to heat gradually destroys it

but ordinary cooking seems to have no effect.

Hitherto nothing has been known concerning its chemical structure and very little about its properties. The Japanese chemists, however, have analyzed the substance they obtained. Whether or not it is vitamin A remains a question for further verification.

They isolated it from cod liver oil, butter and egg yolk. After an involved chemical process a semi-crystalline substance was obtained, constituting about one tenth of one per cent. of the original material. This was found to be composed of carbon, hydrogen and oxygen, with no nitrogen.

A mouse at the point of death because of lack of vitamin A was given minute quantities of the substance daily and in ten days was restored to complete health.

Vitamin A has been considered in the nature of a catalyst, an agent with the power of bringing about extensive chemical changes without being itself altered in the process.

BIG OCEAN SURVEY TO START IN GULF

Definite plans for the beginning of the greatest scientific survey of the ocean ever undertaken are contained in recommendations adopted by a Committee of the Conference on Oceanography, consisting of representatives from various technical bureaus of the Government and allied institutions, in session at the Hydrographic Office of the Navy Department. Reconnaisance of the Gulf of Mexico-Caribbean Sea region and neighboring parts of the North Atlantic and south through the Panama Canal to the Galapagos Islands is proposed, with later more comprehensive and intensive work in both the North Pacific and North Atlantic oceans.

These expeditions in a specially equipped ship, fitted up with laboratories for the examination of specimens taken at sea, are expected to yield information of the highest scientific and practical economic value to fisheries along our coast and farmers in the interior of our country.

Conditions of the western part of the Gulf of Mexico and Caribbean Sea are believed to have a definite bearing on the climate of the southern, middle western and eastern states, while geological exploration on the sea bottom around the Antillean chain may yield important knowledge about earthquakes and volcanic activity.

An inventory of the life in the sea upon which future generations will have to draw more and more for food is contemplated while important fishing banks of immediate commercial value may be located.

The exploring ship will be equipped with the sonic depth finder by which continous sounding and accurate charting of the bottom may be rapidly carried forward. The scientific staff will be under the direction of three scientists of highest caliber; one an oceanographer, one a geologist, and one a biologist, according to the plans outlined by the committee.

NEW INVENTION SHOWS COURSES OF THE STARS

An instrument that is expected to have a great influence on the teaching of popular astronomy has been installed at the German Museum of Natural Science and Technology at Munich. It is the product of the optical firm of Zeiss, and has been under construction for five years. The chief advantage of the machine lies in the fact that it substitutes a realistic and accurate picture of the happenings in the heavens for a confusing arrangement of wires and wooden balls heretofore used.

The "planetarium", as the instrument is called, is of unusual, even weird and startling, appearance. There is something about its general make-up that would suggest a small anti-aircraft cannon, but instead of ending in a long barrel it has as its most essential part a large sphere studded with high-power lenses, resembling a gigantic insect's eye. Each of these lenses is arranged to project the image of a certain part of the heavens, so that the whole starry universe can be made to march across the dome-shaped ceiling of the "sky room" where the planetarium is housed.

All stars down to the sixth magnitude are shown, as well as the milky way, the planets, the sun and the moon. The instrument can be rotated at any speed, showing the celestial events of a day in a period of four minutes, or crowding a year into fifty seconds. Within the artificial sky of the planetarium study the operator has the power of a Joshua; for he can bid the sun and moon to stand still, and cause the stars to run backward in their courses. So accurate is the instrument that after rotations representing five thousand years there is an error of less than two degrees.

CHINESE STARLING SPREADS AT VANCOUVER

The Chinese starling or crested mynah, perhaps the largest and most beautiful of the wide-spread starling family, has obtained a firm foothold about Vancouver, B.C.

The certainty that this oriental visitor will extend its range has caused considerable anxiety along the Pacific coast for, like all starlings, it has a reputation for raiding fruit orchards. The bird now has a radius of about 50 miles about the Vancouver water front. It is advancing in all directions about a mile a year, according to local bird students. An individual specimen has been noted as far south as Portland but it is not certain that this was not an escaped cage bird.

This starling is about the size of a robin with a yelowish white bill overhung by a fan-like crest. Its glossy black plumage is in striking contrast with a large, white marginal wing patch. It makes a good pet but in the wild state it is a marauder, and steals the eggs and nests of other birds.

While little effort has been made to eliminate the visitor it is regarded as decidedly an undesirable by R. F. Butler, secretary of the British Columbia Game Conservation Board.

Air express shipments between army flying fields now occasionally include dogs.

FISH SCALES WEIGH VALUE OF LAKES

How the economic value of various lakes as food producers can be weighed by the scales on fish caught in them, is explained by Homer R. Bien of Indiana University in a report to the Indiana Academy of Sciences.

"On the scales of most of our common fishes are a series of concentric rings which may be readily seen under a low power microscope," Mr. Bolen says. "These rings form alternate dark and light bands due to being closer together in some regions than in others. The dark bands represent periods of slow growth and the light bands periods of rapid growth. Since growth is dependent on food, the dark bands are undoubtedly formed during winter when feeding is partially suspended. Thus by counting the winter bands we can determine the age of the fish."

Mr. Bolen secured scales from a number of bluegill, yellow perch, and large mouthed black bass, from Winona, Shoe, and other lakes in Kosciusko County, Indiana. The fish caught were also weighed and measured. According to the age as shown by the scales, it was found the bluegills of Winona Lake increased more in length between the second and third year than did those caught in Shoe Lake. Yellow perch were also found to be of greater length at given ages in Lake Erie than in Winona Lake.

"If a species grows more rapidly in one lake than in others," claims Mr. Bolen, "it indicates that the food conditions are more favorable there. This may mean that food is more abundant or that competition is less severe. A systematic investigation of rates of growth of the fishes in inland waters will no doubt reveal some very interesting facts on the fertility of our various lakes. From an economic viewpoint it will mean a better knowledge of the possibilities of our lake resources."

PINEAPPLES MUST HAVE REGUALR "IRON RATION"

Pineapples with leaves pale and anemic for lack of iron, starving for iron though there was plenty of it in the soil, and cured finally by being sprayed with an iron solution, are actors in a strange romance of botenical research reviewed by Dr. William Crocker, director of the Boyce Thompson Institute for Plant Research.

The drama began when pineapple planters found that their crop was afflicted with a strange disease that made the leaves yellow and sickly-looking and, of course, greatly diminished the yield, a report to the Engineering Foundation says. Plant physiologists quickly demonstrated that the disease was simply iron starvation - for plants must have iron to make their leaves green just as animals must have it to make their blood red.

But chemical analyses showed that there was plenty of iron in the soil, also great quantities of lime, which had always been supposed to be "good for plants". Then followed the discovery that if there was too much lime the iron was not sufficiently soluble for plants to get it. The lime locked the iron up. Where the soil contained a great deal of manganese the story was the same. And since the two principl pineapple-growing regions under the American flag were thus afflicted - Porto Rico with too much lime, Hawaii with too much manganese - the situation looked serious.

Then a researcher for the Department of Agriculture, working in Porto Rico, found that these sick pineapples could be made healthy again by spraying their leaves with a solution of iron sulphate. Fifty pounds per acre, sprayed on the leaves, affected a complete cure; although 3,000 pounds per acre applied to the soil made no difference whatever - the lime took it all.

The new method of assuring that pineapples "have their iron" at regular intervals has greatly increased the pineapple yield in both Porto Rico and Hawaii. The export of canned fruit from the latter region has exactly doubled.

This method of distributing iron by spraying has lately come to have other applications. In many federal pine tree nurseries in the West, where alkaline soils are common, the seedlings developed the same iron-starvation symptoms, which have been successfully overcome by iron sulphate sprays.

Directly or indirectly, animals and men get most of their salts from plants. A few years ago on certain pasture lands of New Zealand, sheep and cattle developed "bush sickness". This was an iron-deficiency disease. It was later found that if the plants in these pastures were sprayed with iron sulphate and certain other salts, the sickness disappeared.

TABLOID BOOK REVIEW

THE NATURAL HISTORY OF CRYSTALS. By A. E. H. Tutton. New York: E. P. Dutton and Company. $5.00.

This book is an outgrowth of the discovery of new methods of studying crystals, involving the use of X-rays. Previous ideas are reviewed and revised in the light of the new knowledge. There are many excellent plates from photographs, as well as structural diagrams as text figures.

PAN-PACIFIC RESEARCH INSTITUTE ESTABLISHED

The opening of the new Pan-Pacific Research Institute, which is to be an international establishment for the scientific study of food resources in the Pacific area, has been made possible by the gift to the Institution of the Castle home, one of the largest residences in Honolulu, together with four acres of adjacent land. It is expected that this will be the nucleus of a Pan-Pacific University, which has been planned for several years.

The organization of this institution will be unique in that it will be truly international. It will be neither American, nor Hawaiian, nor Japanese, nor the property of any other single nationality, but will be governed by scientists from all the countries of the Pacific.

The directorship of the institution has been offered to Dr. David Starr Jordan, chancellor emeritus of Stanford University.